ADDENDUM

Combined Sewer Overflow Long Term Control Plan

Alternatives Analysis and Recommended Plan Evaluation

Consent Decree NO. 2:16CV512-PPS
NPDES Permit No. IN0022977

Gary Sanitary District

Document History	
Submittal	August 8, 2019
Addendum 1	May 8, 2020

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EPA and IDEM Comments on Gary Sanitary District's (GSD) "Combined Sewer Overflow Alternatives Analysis and Recommended Plan Evaluation," dated August 8, 2019

Response to Agency's comments are in blue.

Overall Comments

1. GSD's Alternative Analysis and Recommended Plan Evaluation raises several significant concerns. These include:

    a. The use of tunnels was rejected as being infeasible for GSD; however, an evaluation of tunnel use based on parametric costs should be provided.

    Response:

    Planning sizing, layout and costs were developed for a deep storage tunnel (Alternative 5.4b). See **Appendix 2** for the information and findings.

    b. In considering remote wet weather treatment and storage basins, GSD evaluated individual Combined Sewer Overflow (CSO)-specific facilities, rather than consolidated facilities serving multiple CSOs. This may have prevented GSD from evaluating more cost-effective applications of these technologies.

    Response:

    Consolidated facilities serving multiple CSO outfalls that are adjacent to each other were explored in feasibility site analysis in **Appendix B** of CSO LTCP. That includes consolidating facilities for CSO 005 and 015 outfalls (32nd Avenue/Broadway West and 32nd Broadway/Alley 1 East) at West Branch Little Calumet River, for CSO 008 and 009 outfalls (Polk Street at East Interceptor/ Pierce Street at East Interceptor) and for CSO 010 and 011 outfalls (Bridge Street at East Interceptor/ Chase Street at East Interceptor). The Phase 3 of the combination alternative/selected plan also included a consolidated storage for CSO 006 and 007 outfalls (Rhode Island and Alley 9 at East Interceptor). In general, storage basins were found to be the most effective if placed adjacent to or relative nearby CSO outfalls. Because of the modest size of the storage basins, the conveyance piping cost to centralized basin serving multiple CSO outfalls of different tributary area is more expensive than constructing individual basins, unless the CSO outfalls were relatively close.

    c. Additional information regarding the bases of GSD's cost estimates is needed, as unit costs for storage and treatment are quite high. In the case of storage, subsurface covered basins were assumed. For remote treatment, Cloth Media Disk

Filter (CMDF) costs were assumed; however, costs still noted to be high compared to (limited available) CMDF experience in Indiana.

Response:

CDM Smith has been performing CSO-related planning, design and construction work across the nation for over 30 years, and in that time we have generated extensive data on CSO construction costs. The unit costs used in the report were taken from this experience and data, and indexed to Gary IN with the standard ENR construction cost index. It should be noted that the cost estimates recognize that at this early stage in planning there is a high degree of uncertainty in field conditions, prevailing local market conditions at the time of bidding, and various other factors, that demand allowances and contingencies be included to avoid under-estimating the expected costs. We believe that these cost estimates are reasonable and appropriately (but not excessively) conservative for purposes of the LTCP process, and we would expect that as the CSO program evolves from early (LTCP) planning to more detailed facilities planning and then to design, the costs may be reduced as allowances for early planning uncertainties are resolved.

Planning level costs include contingency factors that increase the costs because of the many unknowns at this stage of a project. Factors include Undeveloped Design Details (UDD), Site Adjustment Factor (SAF) and Engineering and Administration (E&A). UDD is the preliminary nature of the design and adds 25%. SAF recognize the limited knowledge of the site and is 20%, E&A is the cost to manage and design the facilities and is 15%.

d. The Alternative Analysis considered Green Infrastructure (GI) and Rainfall Derived Infiltration/Inflow (RDI/I) reduction as measures to be carried out by others. No GSD costs were assumed for these measures. However, GSD stated in a recent phone call that no CSO reductions were assigned to these technologies. GSD should confirm that no CSO reductions were assumed for either technology.

Response:

GI and RDII reduction were evaluated in **Section 5** – CSO Control Alternatives Development, and were also listed as overall strategy in each phase of recommended plan in **Section 8** – Selected Plan. However, runoff and CSO reductions were not assumed for both technologies when quantifying the benefits in the selected phased alternative. i.e. The selected alternative would achieve the declared level of CSO control without GI or RDII reduction. This assumption was made because the work for GI and RDII will be performed by others and not controlled by GSD. However, the program is laid out to allow the benefits of GI and RDII to be recognized at the end of each phase of the CSO program and the program to be adjusted for the achieved CSO reduction from GI and RDII.

e. GSD's calculation of percent control indicates that current control is approximately 95%. Recent discussion with GSD indicates this is due to the impact of extended-duration infiltration on the number of "wet" days in the typical year.

At present GSD is not proposing a percent capture-based presumption approach[1]; however, given the aforementioned issue, such a "presumption" approach is not "reasonable" in this case.

Response:

GSD concurs. Alternatives were developed using frequency based level-of-control approach. The percent capture numbers provide another perspective on the benefits of future improvements.

2. GSD needs to correct the numerous tables in which CSO 013 and 015 may have been switched; see Tables 5-3, 5-4, 5-5, 5-6, and 8-4.

Response:

CSO outfall location description was incorrectly flipped for CSO 013 and CSO 015 in **Tables 5-3, 5-4, 5-5, 5-6, and 8-4**, and were corrected and presented in **Appendix 2**.

3. GSD should provide a Financial Capability Analysis (FCA) developed in accordance with Section V of Appendix 3 of the Consent Decree consistent with EPA's CSO Financial Guidance.

Response:

Appendix 3 recasts the originally submitted affordability evaluation to follow the 1997 guidance document format. However, and as noted, in **Appendix 3**, the affordability evaluation is based on the financial information as it existed at the start of FY 2019, since January of 2020, the world has obviously changed significantly with the outbreak of the COVID-19 pandemic. GSD is still evaluating how severe the adverse impacts have been to date and what the implications will be into the future. Based on very preliminary data, weekly receipts for the months of March and April may have declined by as much as one third relative to the average for all of 2019. There is obviously no way to know how long this decline may continue, but even the loss of revenue suffered for the last two months will significantly impair GSD's ability to meet current obligations and certainly will require retrenching its capital program in the short term at least. And the impact could be felt for some time to come. For example, US Steel has idled the Gary Blast Furnace complex, which is a major economic activity in the City, and represents a major risk to the City's future economic prospects. US Steel represents approximately 20 percent of GSD's annual revenues. While the shut-down is officially for 48 days, given the overall economic situation that could be extended for an even further period.

The evaluation presented herein follows the request that the affordability evaluation be recast back to the 1997 guidance document format. However, based on the preceding,

[1] GSD based their proposed plan on a 4/overflow per Typical year presumption

this evaluation should be considered a very optimistic assessment of the GSD's capabilities at least for the short-term.

4. GSD's Recommended Plan has the following significant limitations:

   a. GSD has approved a three-phase plan, but is only committing to the very modest first 5-year phase. This $7.45M (present worth) phase consists largely of system optimization-type projects. The second phase consists of Wastewater Treatment Plant (WWTP) and conveyance expansion, and the third phase consists of near-surface storage basins. GSD's estimated present worth costs for Phases 2 and 3 are $84.8M and $72.6M, respectively. GSD has proposed an adaptive management approach, where the completion of one phase is followed by an assessment to determine the need for the subsequent phase. As such, GSD is not committing to a complete LTCP.

      Response:

      Correct. The financial limitation on the GSD is extreme, and the need for financial investments in their collection system, WWTP and CSO abatement is very large. GSD cannot commit to a complete CSO LTCP at this time. Committing to a complete CSO program would prevent needed expenditures on the collection system and WWTP. The CSO program recommended strikes a balance going forward.

   b. GSD has indicated that it can technically complete the three phases in 25 years, but it cannot meet that schedule due to financial constraints.

      Response:

      Correct.

Detailed Comments

1. Section 1.2 – GSD notes that its sewers are an average 84 years old, with the oldest over 100 years. GSD also notes it has 27 pump stations. What are the conditions of the pump stations?

   Response:

   The pump stations have a range of ages and conditions, with some new and others older. But all pumps stations are regularly inspected and maintained as needed to continue to meet their operational requirements.

2. Table 1-1 – GSD indicates that its CSOs do not discharge to Sensitive Areas (Little and Grand Calumet River); however, it acknowledges that Lake Michigan, which ultimately receives GSD's discharges, is a Sensitive Area.

   Response:

   Correct.

3. Table 2-2 – This table presents regulator and river weir heights over time, with the latest being 2019 elevations. For those outfalls with river weirs, are the outfalls automatically drained back to the interceptor after each discharge? If not, how are the discharge volumes 'caught" between the regulators and the river weirs addressed? Comparison of the weir heights to river elevations (average and flood stages) would be useful.

Response:

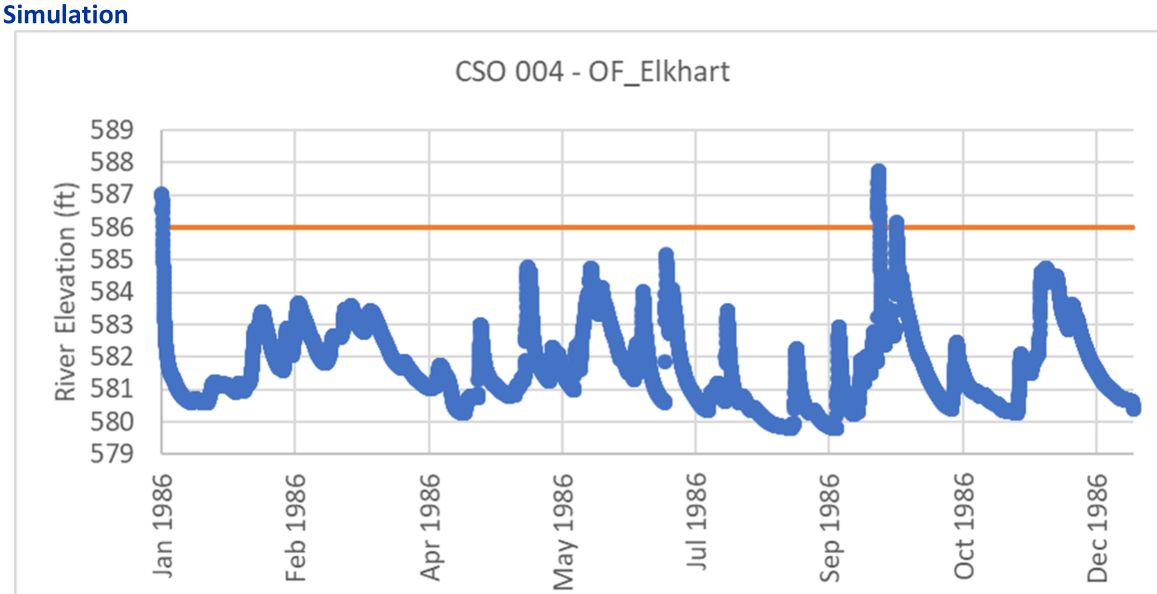
Outfall Sewer Volume Behind River Weir

For outfalls with river weirs, water stored between the regulator weir and the river weir does not drain back to the interceptor. The calculation of CSO volumes to the receiving water is based on the volume which flows over the river weirs. GSD does vacuum out much of the sewage between the weirs between storm events when time and manpower is available.

Weir Heights to River Elevations

In typical-year simulation, the river levels of East Branch Grand Calumet River were always below the outfall weir structures. For the Little Calumet River, the river level at CSO 004 (15th Avenue / Elkhart Street) outfall was higher than outfall invert elevation during the biggest storm in the typical year, but this outfall has a flap gate to prevent river inflow. Weirs at all other CSO outfalls on the Little Calumet River are above the river level.

Figure D3. River Elevation at CSO 004 (Blue) vs. Outfall Elevation (Orange) in Typical Year Model Simulation



4. Section 2.2.2.2 – GSD notes a possible issue with the accuracy of the model representation of activation at the Polk and possibly Pierce CSOs. What steps is GSD undertaking to address this issue?

Response:

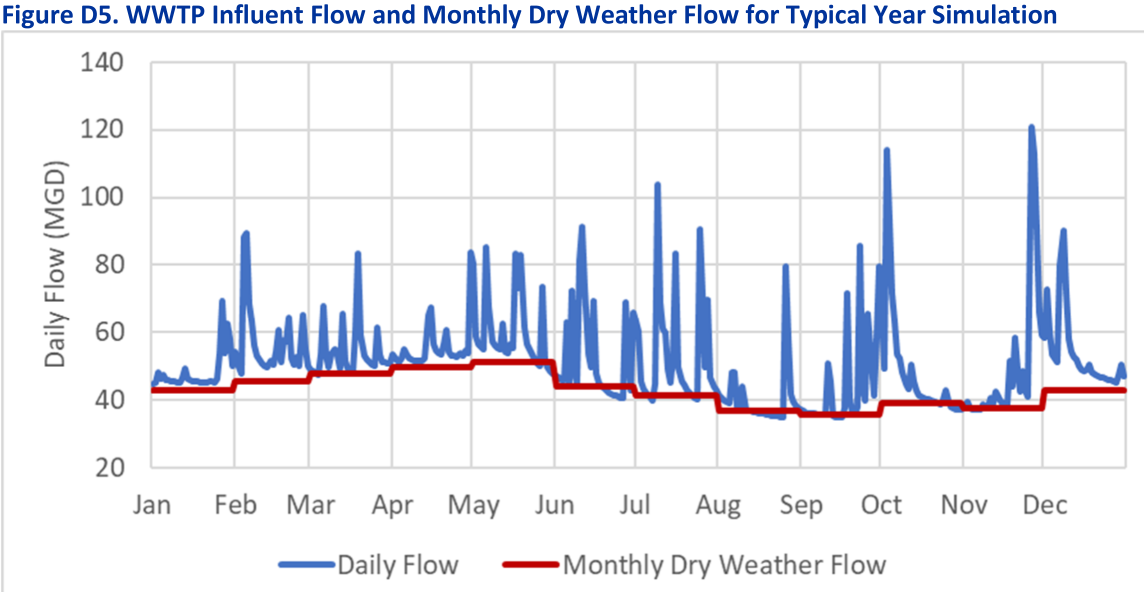
During the CSO LTCP GSD confirmed the weir elevations and outfall configurations for all CSO structures including, Polk and Pierce. GSD plans to preform further investigations into the main interceptors, trunk lines and regulators as part of the Phase 1 CSO Program.

5. Section 2.2.3 – As noted above, GSD's percent capture is based on days above 110% of the monthly average dry weather flow. Does GSD mean above 110% of the average monthly flow? If not, please provide an example of how this is calculated.

Response:

Yes, it is above 110% of the monthly dry weather flows. Daily dry weather flow was derived from daily WTP influent flow using one pass of Lyne-Hollick digital filter with filter parameter ("alpha") of 0.95. Dry weather flow for each month was the average daily values of respective months. Dry weather flow for January through December of typical year were 42.7, 45.6, 47.9, 49.5, 51.3, 43.8, 41.1, 36.8, 35.6, 39.0, 37.6, and 42.9 MGD. For example, any January day with daily flow higher than 47 MGD (110% of 42.7 MGD) would be classified as "wet" and sewage volumes in those days were included in percent capture calculation. The following figure shows daily WWTP flow and derived monthly dry weather flow.

Figure D5. WWTP Influent Flow and Monthly Dry Weather Flow for Typical Year Simulation



6. Section 2.3.1.4 – Why were *E. coli* concentrations different from those listed in Table 2-3 to those used in calculating the loads of *E. coli* to the Little Calumet River (LCR) and Grand Calumet River (GCR)?

   Response:

   Table 2-3 provides the geometric mean for *E. coli* calculated from data collected at all GSD CSO locations. This value includes CSOs which discharge to both the Grand Calumet and Little Calumet Rivers. The *E. coli* values listed in Section 2.3.1.4 are the geometric means calculated specifically for each receiving water based on the CSO discharges to that river. The differences in the value of the geometric mean for each receiving water reflect the different proportions of sanitary sewage and inflow/infiltration in the contributing areas to the CSOs. Use of receiving water specific loads allows for better model calibration and more accurate simulation of impacts from CSO reductions.

7. Section 2.3.2 – GSD's discussion of receiving water quality notes that the water bodies are impacted by both CSOs and other sources, and focuses on river-mile-days of compliance. This approach can undervalue the positive impact of reducing CSOs because concentration reductions that do no change compliance status are not considered. GSD notes that "selected" river segments were evaluated. Additional discussion of which segments were selected and why they were selected is requested. Additional discussion of the use of 4,000/100 milliliter (ml) *E. coli* as an indicator of CSO impact is also requested.

   Response:

   River-mile-days of compliance is only one of three metrics discussed in Section 2.3.2. in addition to (1) the river-mile-days of compliance, (2) the percentage of river miles in compliance with the geomean standard and (3) the percent of hours which exceed selected numeric criteria were presented. The three metrics were selected to provide both information along the river and at discreet points, including downstream of CSOs. In some instances the river-miles-days metric might not improve with a reduction in CSOs due to high background concentrations or an increase in untreated stormwater loads. It is important to use a metric like river-mile-days so that alternatives are not implemented if they reduce water quality. The use of three metrics for evaluation of scenarios provides a clearer picture of positive impacts from CSO reduction than just a single metric or a metrics calculated at a single location.

   The "selected" river segments were located 1) downstream of CSOs to provide information on the impacts of CSO to the immediate downstream conditions, 2) upstream and downstream of junctions with major tributaries to show the contribution from the CSOs and tributary sources, and 3) at Lake Michigan to allow for assessment of compliance with the Lake Michigan TMDL.

   The 4,000 CFU/100 ML metric was selected because this value is the background concentration used for runoff and stormwater flows. Any concentrations above this indicate that there is impact from CSOs in that segment/time. This metric was used as a general indicator of CSO discharges to guide understanding of the impact from CSOs, but was not used to select the final recommended plan. The 4,000 CFU/100 ML is based on data from the Grand Calumet and Little Calumet Rivers and would not necessarily be indicative of CSO impacts in other systems.

8. Section 3 – As noted above, tunnel storage was eliminated from consideration as being costly and high risk; however, additional support for this statement should be provided. In considering (near) surface storage and wet weather treatment, GSD's evaluation has focused on the installation of individual facilities at each CSO. Consideration of consolidation in some degree is often a more cost-effective way to apply storage and/or treatment. GSD has assumed that all storage facilities would be covered, near-surface facilities and that all treatment facilities would be CMDF units. Such assumptions likely resulted in these technologies appearing more expensive than necessary. During a phone call on December 8, 2019 GSD agreed to add an abbreviated evaluation of tunnel use base on parametric costs.

Response:

See response to General Comment 1.a. for tunnel storage. Consolidation of CSO facilities is in response to General Comment 1.b. Covered storage is required when the facilities are in the community, such as the ones considered for GSD. Uncovered storage is viable only at the WWTP site. CMDF was considered for treatment because it will meet or exceed being equivalent to primary or better and is acceptable to IDEM. Other comparable treatment technologies are expected to have similar costs.

9. Section 4 – GSD notes that it has experienced significant increases in Carbonaceous Biochemical Oxygen Demand (CBOD) and ammonia loads to its WWTP since 2014. What steps has/is GSD taking to determine the cause(s) of these increases?

Response:

The increase in (CBOD) and ammonia loads to the WWTP since 2014 are due primarily to the increase in hauled waste flows (leachate).

10. Section 4.2.4 – GSD notes that a significant amount of equipment at the WWTP is reaching the end of its useful life. GSD identifies several WWTP projects either in-process or expected in the next 5 years, but then goes on to identify a much larger set of projects that will be needed "in the next 30 years." Additional information is requested on remaining service life of existing WWTP equipment, and when those additional expenditures are likely to be required.

Response:

The equipment listed will be reaching the end of its useful life in the next 30 years. The project prioritization was based on a preliminary analysis and staff anecdotal information and detailed knowledge. The improvements that do not need attention in next 5 years will be assessed for prioritization later after completion of current ongoing projects (aeration, boiler, and grit). The CSO LTCP is not the appropriate report to determine the details of the WWTP requirements for the next 30 years. The CSO LTCP recognizes the need for near-term (5 years) improvements and the need for long term replacement/repair, but not the details of the work between 5- and 30-years.

11. Section 5 – It appears that GSD has only considered one "hybrid" control alternative. For many combined sewer systems (CSS), more than one "hybrid" is worth considering. Also, provide additional information documenting why is separation so ineffective in the CSO 13 catchment?

Response:

Combination Alternative

GSD evaluated numerous CSO controls, both individual and in combination (hybrid) for the alternative analysis. The Selected Plan contains a large combination of CSO controls (regulator modification, RTC, increased conveyance, expanded WWTP, and satellite storage). By "Hybrid" controls, the Agency is looking for a storage and a treatment facility to store/treat CSOs. These were not considered for the following reasons. GSD CSO discharge are modest to small in volume and peak flow. Building two facilities (storage and treatment) is more expensive than building one facility (storage) larger. Hybrid CSO facilities are more effective for large CSO discharge with high peak flow. For these, storing some of the flow can dramatically reduce the treatment peak flows and be more cost effective.

CSO 13 Catchment

Overflows at CSO 013 (25th Avenue and Louisiana Street) outfall is partially caused by back up from Rhode Island Street and Alley 9 trunk sewers downstream (CSO 006 and 007) and flows from Broadway Corridor upstream (CSO 005/015). Sewer separation within CSO 013 catchment alone would not eliminate overflows at this outfall.

12. Section 5.8 – In presenting the Relief Sewer alternative (Alternative 8), GSD has listed the measures needed for each Level of Control (LoC) in addition to those listed for the LoCs already described. GSD should clarify whether upsizing any of those previously listed measures is required at each higher LoC. Provision of a complete description of the measures required for each LoC may be clearer.

Response:

Complete description for each level of control is listed below:

Design for 8 Overflows per Year

- **WWTP**: influent pumps accept flows at 180 MGD
- **CSO 004 (15th Avenue and Elkhart Street) area:** replace existing 3-ft diameter pipe between 15th/Clay PS and Elkhart regulator with a 4-ft diameter pipe. CSO drops to 7 per year and will not occur before 15th/Clay Pump Station operates at firm capacity.
- **CSO 013 (25th Avenue and Louisiana Street) area:** install structures that raise overflow elevation by 1 foot
- **CSO 013 (25th Avenue and Louisiana Street) area:** construct 2.5-ft diameter relief sewer pipe to connect with the system west of 25th/Grant.

- **Broadway Corridor:** during wet weather, open fully the sluice gates of the two diversion sewers before water level exceeds overflow weirs of CSO 005 (32nd Avenue and Broadway West) and CSO 015 (32nd Broadway and Alley 1 East) outfalls. More flows will be diverted towards 27th/Chase Pump Station. During dry weather, the sluice gates can be closed to reduce sending flows to 27th/Chase Pump Station and reduce energy cost.

Design for 6 Overflows per Year

- **WWTP:** influent pumps accept flows at 180 MGD
- **CSO 004 (15th Avenue and Elkhart Street) area:** replace existing 3-ft diameter pipe between 15th/Clay PS and Elkhart regulator with a 4-ft diameter pipe. Replace a section of sewer downstream of 15th/Clay Pump Station to allow pumping at total capacity (26,400 GPM); CSO 004 outfall cannot get below 6 overflows per year without major upgrades at the 15th/Clay Pump Station
- **CSO 006/007/008/009 (Rhode Island Street at East Interceptor/Alley 9 at East Interceptor/Polk Street at East Interceptor/Pierce Street at East Interceptor) outfall regulator:** install structures that raise overflow elevation to crown of pipe.
- **CSO 013 (25th Avenue and Louisiana Street) area:** install structures that raise overflow elevation by 1 foot
- **CSO 013 (25th Avenue and Louisiana Street) area:** construct 2.5-ft diameter relief sewer pipe to connect with the system west of 25th/Grant; construct 2.4 miles of 3-ft sewer from 25th/Jackson to 15th/Chase to re-route runoff from the vicinity.
- **Broadway Corridor:** during wet weather, open fully the sluice gates of the two diversion sewers before water level exceeds overflow weirs of CSO 005 (32nd Avenue and Broadway West) and CSO 015 (32nd Broadway and Alley 1 East) outfalls. More flows will be diverted towards 27th/Chase Pump Station. During dry weather, the sluice gates can be closed to reduce sending flows to 27th/Chase Pump Station and reduce energy cost

Design for 4 Overflows per Year

- **WWTP:** influent pumps accept flows at 180 MGD
- **CSO 004 (15th Avenue and Elkhart Street) area:** replace existing 3-ft diameter pipe between 15th/Clay PS and Elkhart regulator with a 4-ft diameter pipe. Replace a section of sewer downstream of 15th/Clay Pump Station to allow pumping at total capacity (26,400 GPM); CSO 004 outfall cannot get below 6 overflows per year without major upgrades at the 15th/Clay Pump Station.
- **CSO 006 through 011 (Rhode Island Street at East Interceptor/Alley 9 at East Interceptor/Polk Street at East Interceptor/Pierce Street at East**

Interceptor/Bridge Street at East Interceptor/Chase Street at East Interceptor) outfall regulator: install structures that raise overflow elevation to crown of pipe.

- **CSO 013 (25th Avenue and Louisiana Street) area:** install structures that raise overflow elevation by 1 foot
- **CSO 013 (25th Avenue and Louisiana Street) area:** construct 2.5-ft diameter relief sewer pipe to connect with the system west of 25th/Grant; construct 2.4 miles of 4-ft and 6-ft diameter sewer from 25th/Jackson to 15th/Chase to re-route runoff from the vicinity.
- **Broadway Corridor:** during wet weather, open fully the sluice gates of the two diversion sewers before water level exceeds overflow weirs of CSO 005 (32nd Avenue and Broadway West) and CSO 015 (32nd Broadway and Alley 1 East) outfalls. More flows will be diverted towards 27th/Chase Pump Station. During dry weather, the sluice gates can be closed to reduce sending flows to 27th/Chase Pump Station and reduce energy cost
- **Broadway Corridor:** Construct a second diversion structure at 32nd/Broadway and convert a section of the 5-ft diameter 32nd/Broadway West outfall sewer to relief sewer (see insert of **Figure 5-10**). This sewer would only receive flow during wet weather.
- **Chase Street Bypass Sewer:** A 3-ft sewer connects directly to the WWTP junction chamber #1 from 4th/Chase, bypassing East Interceptor and Chase outfall regulator
- **27th/Chase Pump Station:** reconstruct its force main to allow pumping at total capacity (60,000 GPM). The force main will connect to the proposed 6-ft diameter sewer.
- **East Interceptor 2:** A new 5-ft to 7-ft diameter parallel sewer along the existing East Interceptor is needed to reduce to 4 overflows per year at Pierce, Polk, Rhode Island and Alley 9 outfalls

Design for 2 Overflows per Year

- **WWTP:** influent pumps accept flows at 220 MGD
- **CSO 004 (15th Avenue and Elkhart Street) area:** replace existing 3-ft diameter pipe between 15th/Clay PS and Elkhart regulator with a 4-ft diameter pipe. Replace a section of sewer downstream of 15th/Clay Pump Station to allow pumping at total capacity (26,400 GPM); CSO 004 outfall cannot get below 6 overflows per year without major upgrades at the 15th/Clay Pump Station.
- **CSO 006 through 011 (Rhode Island Street at East Interceptor/Alley 9 at East Interceptor/Polk Street at East Interceptor/Pierce Street at East Interceptor/Bridge Street at East Interceptor/Chase Street at East Interceptor) outfall regulator:** install structures that raise overflow elevation to crown of pipe.

- **CSO 013 (25th Avenue and Louisiana Street) area:** install structures that raise overflow elevation by 1 foot
- **CSO 013 (25th Avenue and Louisiana Street) area:** construct 2.5-ft diameter relief sewer pipe to connect with the system west of 25th/Grant; construct 2.4 miles of 4-ft and 6-ft diameter sewer from 25th/Jackson to 15th/Chase to re-route runoff from the vicinity.
- **Broadway Corridor:** during wet weather, open fully the sluice gates of the two diversion sewers before water level exceeds overflow weirs of CSO 005 (32nd Avenue and Broadway West) and CSO 015 (32nd Broadway and Alley 1 East) outfalls. More flows will be diverted towards 27th/Chase Pump Station. During dry weather, the sluice gates can be closed to reduce sending flows to 27th/Chase Pump Station and reduce energy cost
- **Broadway Corridor:** Construct a second diversion structure at 32nd/Broadway and convert a section of the 5-ft diameter 32nd/Broadway West outfall sewer to relief sewer (see insert of **Figure 5-10**). This sewer would only receive flow during wet weather.
- **Broadway to 27th/Chase Sewer:** Increase the size of sewer to 6 ft
- **27th/Chase Pump Station:** reconstruct its force main to allow pumping at total capacity (60,000 GPM). The force main will connect to the proposed 6-ft diameter sewer.
- **Chase Street Bypass Sewer:** A 5-ft sewer connects directly to the WWTP junction chamber #1 from 4th/Chase, bypassing East Interceptor and Chase outfall regulator
- **East Interceptor 2:** construct a 5-ft to 8-ft diameter parallel sewer along existing East Interceptor, totaling 2.72 miles
- **West Interceptor:** 5,100 ft of existing 3-ft diameter pipes will be replaced by 3.5-ft diameter pipes

13. Section 5.10 – GSD should provide anticipated stand-alone performance for Real Time Control (RTC).

Response:

The two evaluated scenarios in **Section 5.10** are stand-alone RTC scenarios.

An additional scenario is simulated with only controlling the sluice gates positions at the 32nd/Alley 1 E Diversion Structure. The impact on CSO frequency and volume are summarized in **Tables D13.1** and **D13.2** in **Appendix 2**. Operating the diversion structure would only reduce CSO frequency and volume at CSO 005 and 015 (32nd Avenue/Broadway West and 32nd Broadway/Alley 1 East). CSO frequency reduces from 13 to 7. There is negligible impact to the other outfalls.

14. Section 6 – In a recent phone call, GSD stated that no control by GI or RDI/I reduction is assumed in its analyses. However, aspects of the report (e.g. Tables 5-9 and 6-2) imply that the performance of these technologies may have been included in the proposed alternative. GSD should confirm that GI and RD/I reduction control have not been included in the expected plan performance.

    Response:

    Addressed in overall comment 1d.

15. Figure 6-10 – As noted above, this figure suggests that several different "hybrid" alternatives were considered by GSD. What specific measures were included in each LoC, and what were the associated costs? On the combination alternatives, do the dots in the purple line represent the three phases of the proposed plan? The scale on this figure and other Section 6 figures are too small to allow extraction of accurate costs. It is noted that this figure suggests that 4 Overflows/Typical Year is below the cost-effectiveness "knee of the curve" for GSD's proposed alternative.

    Response:

Specific Measures and Costs

The selection of combination/hybrid alternative was discussed in **Sections 5.16** and **8**. For each CSO outfall tributary area, improvements are selected by considering the CSO impact, feasibility and cost-effectiveness of other systemwide alternatives (Alternatives 1 to 12, 14 and 15). Specific measure for the hybrid alternative was discussed as Phases 1, 2 and 3. Phases 1, 2, and 3 of the hybrid alternative are equivalent to reducing CSO frequency to 12, 7 and 4 per year, respectively. Cost of phased hybrid alternative is summarized in **Table 5-10**.

Purple Dots in Figure 6-10

Yes, the dots in the purple line represent the three phases of the proposed plan/ combination alternative.

Scale of Figures in Section 6 Are Too Small to Extract Cost

Data used in **Figures 6-9** to **6-16** are tabulated across **Tables 5-9**, **6-1**, **6-2**, **6-4**, **6-5**, and **6-6**. Figures in log-scale are available in **Appendix 2**.

Appendix 1

U.S. Environmental Protection Agency's Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

FEB 2 6 2020

REPLY TO THE ATTENTION OF

ECW-15J

CERTIFIED MAIL 7018 3090 0002 2022 6183
RETURN RECEIPT REQUESTED

Mr. Daniel F. Vicari
Executive Director
Gary Sanitary District
3600 West 3rd Avenue, Gary, Indiana 46402

Mr. Gregory L. Thomas
City of Gary Corporation Counsel
401 Broadway, Gary, Indiana 46402

Subject: Comments on Gary Sanitary District's Alternative Analysis and Recommended Plan Evaluation

Dear Mr. Vicari and Mr. Thomas:

Enclosed is U.S. Environmental Protection Agency's and Indiana Department of Environmental Management's (IDEM's) (our) response and comments to Gary Sanitary District's (GSD) Alternative Analysis and Recommended Plan Evaluation dated August 7, 2019.

Based on the significant number of comments included in the attachment, we disapprove the submission, per Section XIX of the March 19, 2018, Consent Decree. Please review the comments and provide an addendum that addresses the issues raised by these comments within 45 days of receipt. EPA and GSD have held three phone calls since GSD's submission and discussed most of the comments included in this letter. GSD has agreed to provide an addendum to the submission addressing our comments.

Thank you for your efforts to protect water quality. If you have any questions or concerns regarding this letter, contact Andi Hodaj of my staff at (312) 353-4645 or, at hodaj.andi@epa.gov.

Sincerely,

Elizabeth Murphy for

Ryan Bahr, Acting Chief
Water Enforcement and Compliance Assurance Branch

Enclosure

cc (via email): Dan Vicari, GSD
Mark Koller, EPA, Region 5
Dave Tennis, IDEM
Kara Wendholt, IDEM
Beth Admire, IDEM
Sushila Nanda, EPA
Mark Klingenstein, ERG

Attachment

SUBJECT: EPA and IDEM Comments on Gary Sanitary District's (GSD) "Combined Sewer Overflow Alternatives Analysis and Recommended Plan Evaluation," dated August 8, 2019

Overall Comments

1. GSD's Alternative Analysis and Recommended Plan Evaluation raises several significant concerns. These include:
    a. The use of tunnels was rejected as being infeasible for GSD; however, an evaluation of tunnel use based on parametric costs should be provided.
    b. In considering remote wet weather treatment and storage basins, GSD evaluated individual Combined Sewer Overflow (CSO)-specific facilities, rather than consolidated facilities serving multiple CSOs. This may have prevented GSD from evaluating more cost-effective applications of these technologies.
    c. Additional information regarding the bases of GSD's cost estimates is needed, as unit costs for storage and treatment are quite high. In the case of storage, subsurface covered basins were assumed. For remote treatment, Cloth Media Disk Filter (CMDF) costs were assumed; however, costs still noted to be high compared to (limited available) CMDF experience in Indiana.
    d. The Alternative Analysis considered Green Infrastructure (GI) and Rainfall Derived Infiltration/Inflow (RDI/I) reduction as measures to be carried out by others. No GSD costs were assumed for these measures. However, GSD stated in a recent phone call that no CSO reductions were assigned to these technologies. GSD should confirm that no CSO reductions were assumed for either technology.
    e. GSD's calculation of percent control indicates that current control is approximately 95%. Recent discussion with GSD indicates this is due to the impact of extended-duration infiltration on the number of "wet" days in the typical year. At present GSD is not proposing a percent capture-based presumption approach[1]; however, given the aforementioned issue, such a "presumption" approach is not "reasonable" in this case.

2. GSD needs to correct the numerous tables in which CSO 013 and 015 may have been switched; see Tables 5-3, 5-4, 5-5, 5-6, and 8-4.
3. GSD should provide a Financial Capability Analysis (FCA) developed in accordance with Section V of Appendix 3 of the Consent Decree consistent with EPA's CSO Financial Guidance.
4. GSD's Recommended Plan has the following significant limitations:

GSD has proposed a three-phase plan, but is only committing to the very modest first 5-year phase. This $7.45M (present worth) phase consists largely of system optimization-type projects. The second phase consists of Wastewater Treatment

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[1] GSD based their proposed plan on a 4/overflow per Typical Year presumption

Plant (WWTP) and conveyance expansion, and the third phase consists of near-surface storage basins. GSD's estimated present worth costs for Phases 2 and 3 are $84.8M and $72.6M, respectively. GSD has proposed an adaptive management approach, where the completion of one phase is followed by an assessment to determine the need for the subsequent phase. As such, GSD is not committing to a complete LTCP.

b. GSD has indicated that it can technically complete the three phases in 25 years, but it cannot meet that schedule due to financial constraints.

Detailed Comments

1. Section 1.2 – GSD notes that its sewers are an average of 84 years old, with the oldest over 100 years. GSD also notes it has 27 pump stations. What are the conditions of the pump stations?

2. Table 1-1 – GSD indicates that its CSOs do not discharge to Sensitive Areas (Little and Grand Calumet River); however, it acknowledges that Lake Michigan, which ultimately receives GSD's discharges, is a Sensitive Area.

3. Table 2-2 – This table presents regulator and river weir heights over time, with the latest being 2019 elevations. For those outfalls with river weirs, are the outfalls automatically drained back to the interceptor after each discharge? If not, how are the discharge volumes "caught" between the regulators and the river weirs addressed? Comparison of the weir heights to river elevations (average and flood stages) would be useful.

4. Section 2.2.2.2 – GSD notes a possible issue with the accuracy of the model representation of activation at the Polk and possibly Pierce CSOs. What steps is GSD undertaking to address this issue?

5. Section 2.2.3 – As noted above, GSD's percent capture is based on days above 110% of the monthly average <u>dry weather flow</u>. Does GSD mean above 110% of the average monthly flow? If not, please provide an example of how this is calculated.

6. Section 2.3.1.4 – Why were E. coli concentrations different from those listed in Table 2-3 to those used in calculating the loads of E. coli to the Little Calumet River (LCR) and Grand Calumet River (GCR)?

7. Section 2.3.2 – GSD's discussion of receiving water quality notes that the water bodies are impacted by both CSOs and other sources, and focuses on river-mile-days of compliance. This approach can undervalue the positive impact of reducing CSOs because concentration reductions that do not change compliance status are not considered. GSD notes that "selected" river segments were evaluated. Additional discussion of which segments were selected and why they were selected is requested. Additional discussion of

the use of 4,000/100 milliliter (ml) E. coli as an indicator of CSO impact is also requested.

8. Section 3 – As noted above, tunnel storage was eliminated from consideration as being costly and high risk; however, additional support for this statement should be provided. In considering (near) surface storage and wet weather treatment, GSD's evaluation has focused on the installation of individual facilities at each CSO. Consideration of consolidation in some degree is often a more cost-effective way to apply storage and/or treatment. GSD has assumed that all storage facilities would be covered, near-surface facilities and that all treatment facilities would be CMDF units. Such assumptions likely resulted in these technologies appearing more expensive than necessary. During a phone call on December 18, 2019 GSD agreed to add an abbreviated evaluation of tunnel use base on parametric costs.

9. Section 4 – GSD notes that it has experienced significant increases in Carbonaceous Biochemical Oxygen Demand (CBOD) and ammonia loads to its WWTP since 2014. What steps has/is GSD taking to determine the cause(s) of these increases?

10. Section 4.2.4 – GSD notes that a significant amount of equipment at the WWTP is reaching the end of its useful life. GSD identifies several WWTP projects either in-process or expected in the next 5 years, but then goes on to identify a much larger set of projects that will be needed "in the next 30 years." Additional information is requested on remaining service life of existing WWTP equipment, and when those additional expenditures are likely to be required.

11. Section 5 – It appears that GSD has only considered one "hybrid" control alternative. For many combined sewer systems (CSS), more than one "hybrid" is worth considering. Also, provide additional information documenting why is separation so ineffective in the CSO 13 catchment?

12. Section 5.8 – In presenting the Relief Sewer alternative (Alternative 8), GSD has listed the measures needed for each Level of Control (LoC) in addition to those listed for the LoCs already described. GSD should clarify whether upsizing any of those previously listed measures is required at each higher LoC. Provision of a complete description of the measures required for each LoC may be clearer.

13. Section 5.10 – GSD should provide anticipated stand-alone performance for Real Time Control (RTC).

14. Section 6 – In a recent phone call, GSD stated that no control by GI or RDI/I reduction is assumed in its analyses. However, aspects of the report (e.g. Tables 5-9 and 6-2) imply

that the performance of these technologies may have been included in the proposed alternative. GSD should confirm that GI and RD/I reduction control have not been included in the expected plan performance.

15. Figure 6-10 – As noted above, this figure suggests that several different "hybrid" alternatives were considered by GSD. What specific measures were included in each LoC, and what were the associated costs? On the combination alternatives, do the dots in the purple line represent the three phases of the proposed plan? The scale on this figure and other Section 6 figures are too small to allow extraction of accurate costs. It is noted that this figure suggests that 4 Overflows/Typical Year is below the cost-effectiveness "knee of the curve" for GSD's proposed alternative.

Appendix 2

Collection System Modeling

This section includes additional tables and charts in response to overall comment #1, overall comment #2, detail comment #13 and detail comment #15.

Overall Comment #1

Planning level, sizing, layout and costs were developed for two tunnel options. See below for additional tunnel information.

Alternative 5.4b – Deep Tunnel Storage

Concept

This alternative is a deep tunnel (offline storage) to store the combined sewage that would have discharged to receiving waters in existing conditions. The tunnel would be empty during dry weather and small storm events and would only be utilized when sewer levels rise above the existing overflow elevation. Stored volume in the tunnel would be drained back to the WWTP headworks by pump within 24 or 48 hours. For this analysis, control levels of 4-, 2-, and 0-overflows per year were considered. Lower levels of control 10-, 8- and 6- overflow per year storage are too small to be viable for tunnel storage.

Overview – Typical Layout

Tunnels are underground and receive water by gravity flow and are pumped out via a deep pump station to the WWTP. Consolidation pipes convey flow from each CSO regulator to a drop shaft. From the drop shaft a short horizontal gallery conveys flow to a main tunnel. At the downstream end of the tunnel a deep pump station will pump the stored flows to the headworks of the WWTP.

For this analysis two options for tunnels are considered.

<u>Option 1 – Systemwide Tunnel</u>. For this option the tunnel would receive CSO overflows from all eleven CSOs on the Grand Calumet and Little Calumet Rivers. The tunnel would be approximately 8 miles long and have seven drop shafts. The diameter of the tunnel and pump station would vary based on the size of control.

<u>Option 2 – Grand Calumet East CSO Tunnel.</u> For this option the tunnel would control only the CSOs east of the WWTP on the Grand Calumet River. These CSO discharge the majority of the CSO volume for the large storms, about 70%. The tunnel would be approximately 3.5 miles long and have 3 drop shafts. The diameter of the tunnel and pump station would vary based on the size of control. This tunnel option would require construction of CSO facilities for the CSOs not controlled by this tunnel. These include the CSOs on the Little River and Colfax CSO, west of the WWTP.

Sizing for Different Target Level of Controls

Sizing for the tunnel storage was based on typical-year CSO volumes from the calibrated collection system model. To reduce to 4, 2 and 0 overflows per year, the storage facilities were sized for the 5th, 3rd, and the largest CSO event by volume at each outfall. **Table D-1.1** summarizes the storage volumes for each CSO outfall tributary area.

Table D-1.1. Tunnel Storage Requirements

Tunnel	Requirements to Achieve Target (# of overflows per year)		
	4	2	0
Systemwide Tunnel			
Tunnel Length (miles)	8	8	8
Tunnel Diameter (ft)	10	15	20
Tunnel Volume (MG)	25	52	100
Pump Station Capacity (MGD)	15	30	50
Grand Calumet East of the WWTP Tunnel			
Tunnel Length (miles)	3.5	3.5	4
Tunnel Diameter (ft)	11	18	22
Tunnel Volume (MG)	13	35	61
Pump Station Capacity (MGD)	10	20	30

Sites

At this planning level of analysis, drop shafts for the tunnel would be located at the sites considered for storage or treatment facilities.

Probable Costs

Tunnel costs were developed for both tunnel options to allow for 4, 2, and 0 overflow events per year. Costs for storage tunnel include gravity sewer, drop shafts, tunnel and pump station. Operation and maintenance costs were assumed to be 2% of the total capital costs. Present worth costs for all outfalls per number of target overflow events are shown in **Figure D-1.1**. For Tunnel Option 2 Grand Calumet East of the WWTP Tunnel, Satellite storage facilities were added for the CSOs not controlled by the tunnel. For 4- and 2- overflows per year GCR Tunnel with satellite storage elsewhere is less than a systemwide tunnel. For 0 overflows per year, the systemwide tunnel is the last expansive.

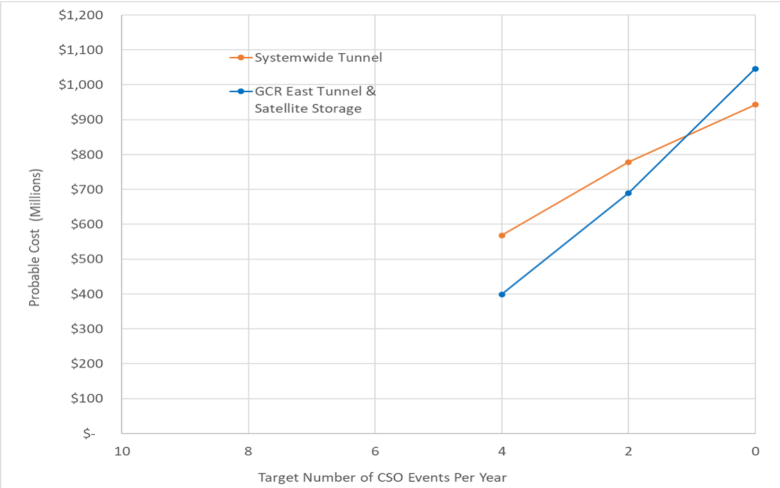


Figure D-1.1. Present Worth Costs of Satellite Storage per Target of Control

Comparison of Tunnel to Satellite Storage

Tunnel costs are higher than satellite storage for the 4- and 2- overflows per year but less for the 0 overflows per year level of control.

Overall Comment #2

CSO outfall description was corrected for CSO 013 and 015 for **Tables 5-3, 5-4, 5-5, 5-6,** and **8-4**.

Table 5-3. Extent of Partial Sewer Separation for Different Target Levels of Control

NPDES Outfall #	Outfall Location	Number of Overflow (Current)	Combined Tributary Area (ac)	Percent of Area Separated to Achieve Target Level of Control in Individual CSO Outfall (# of overflows per year)					
				10	8	6	4	2	0
West Branch Little Calumet River									
004	15th Avenue and Elkhart Street	16	1,945	49%	55%	72%	86%	100%	n/a
005	32nd Avenue and Broadway West	13	1,145	8%	10%	86%	100%	n/a	n/a
015	32nd Broadway and Alley 1 East	13							
013	25th Avenue and Louisiana Street	26	630	100%	100%	100%	100%	n/a	n/a
East Branch Grand Calumet River									
006	Rhode Island Street at East Interceptor	10	1,415	13%	22%	22%	61%	100%	n/a
007	Alley 9 at East Interceptor	4							
008	Polk Street at East Interceptor	9	75	-	32%	100%	100%	100%	100%
009	Pierce Street at East Interceptor	14	925	24%	27%	68%	87%	100%	n/a
010	Bridge Street at East Interceptor	3	810	-	-	-	-	100%	100%
011	Chase Street at East Interceptor	3	2,950	-	-	-	-	12%	24%
012	Colfax Street at West Interceptor	5	1,205	-	-	-	18%	65%	100%
Area partially separated (acres)				2,084	2,395	4,021	5,415	8,090	8,862

Note: n/a = cannot achieve the respective target

Table 5-4. Present Worth Cost of Partial Sewer Separation by CSO Outfall Tributary Area

NPDES Outfall #	Outfall Location	Number of Overflow (Current)	Combined Tributary Area (ac)	Present Worth Cost (in $ million) to Achieve Target (# of overflows per year)					
				10	8	6	4	2	0
West Branch Little Calumet River									
004	15th Avenue and Elkhart Street	16	1,945	335	372	486	587	679	n/a
005	32nd Avenue and Broadway West	13	1,145	31	41	345	400	n/a	n/a
015	32nd Broadway and Alley 1 East	13							
013	25th Avenue and Louisiana Street	26	630	220	220	220	220	n/a	n/a
East Branch Grand Calumet River									
006	Rhode Island Street at East Interceptor	10	1,415	63	106	106	301	494	n/a
007	Alley 9 at East Interceptor	4							
008	Polk Street at East Interceptor	9	75	-	8	26	26	26	26
009	Pierce Street at East Interceptor	14	925	79	87	221	280	323	n/a
010	Bridge Street at East Interceptor	3	810	-	-	-	-	283	283
011	Chase Street at East Interceptor	3	2,950	-	-	-	-	125	249
012	Colfax Street at West Interceptor	5	1,205	-	-	-	76	275	421
			SYSTEMWIDE TOTAL	**728**	**836**	**1,403**	**1,890**	**2,824**	**3,094**

Note: n/a = cannot achieve the respective target

Table 5-5. Satellite Storage Volumes at Each CSO Outfall Tributary Area

NPDES Outfall #	Outfall Location	Number of Overflow (Current)	Volume (in MG) to Achieve Target (# of overflows per year)					
			10	8	6	4	2	0
West Branch Little Calumet River								
004	15th Avenue and Elkhart Street	16	0.22	0.32	0.82	1.4	2.3	6.7
005	32nd Avenue and Broadway West	13	0.04	0.23	0.89	1.8	13	22
015	32nd Broadway and Alley 1 East	13						
013	25th Avenue and Louisiana Street	26	0.53	0.67	1.2	1.6	4.2	7.3
		TOTAL	0.79	1.2	2.9	4.7	19	36
East Branch Grand Calumet River								
006	Rhode Island Street at East Interceptor	10	0.08	0.17	1.7	3.7	11	17
007	Alley 9 at East Interceptor	4						
008	Polk Street at East Interceptor	9	-	<0.01	0.1	0.4	0.7	2.0
009	Pierce Street at East Interceptor	14	1.3	2.8	6.3	7.2	21	29
010	Bridge Street at East Interceptor	3	-	-	-	-	0.03	2.4
011	Chase Street at East Interceptor	3	-	-	-	-	0.03	6.3
012	Colfax Street at West Interceptor	5	-	-	-	-	0.94	4.7
		TOTAL	1.4	3.0	8.1	11	33	62
		SYSTEMWIDE TOTAL	**2.2**	**4.2**	**11**	**16**	**52**	**98**

Table 5-6. Satellite CSO Treatment Capacities at Each CSO Outfall Tributary Area

NPDES Outfall #	Outfall	Number of Overflow (Current)	Treatment Capacity (in MGD) to Achieve Target (# of overflows per year)					
			10	8	6	4	2	0
West Branch Little Calumet River								
004	15th Avenue and Elkhart Street	16	3.4	4.3	8.6	12	29	63
005	32nd Avenue and Broadway West	13	0.36	0.7	4.1	11	27	63
015	32nd Broadway and Alley 1 East	13	6.7	7.2	11	19	44	101
013	25th Avenue and Louisiana Street	26	0.53	4.7	10	18	34	66
East Branch Grand Calumet River								
006	Rhode Island Street at East Interceptor	10	1.9	3.8	22	29	70	108
007	Alley 9 at East Interceptor	4	-	-	-	-	20	47
008	Polk Street at East Interceptor	9	-	<0.1	2.3	3.4	10	22
009	Pierce Street at East Interceptor	14	13	21	35	50	85	164
010	Bridge Street at East Interceptor	3	-	-	-	-	0.66	44
011	Chase Street at East Interceptor	3	-	-	-	-	0.68	114
012	Colfax Street at West Interceptor	5	-	-	-	1.0	16	71
		SYSTEMWIDE TOTAL	23	38	90	143	335	864

Table 8-4. CSO Discharge Frequency from Current Condition to Selected Alternative

NPDES Outfall #	Outfall Location	Current	Selected Alternative		
			Phase 1	Phase 2	Phase 3
West Branch Little Calumet River					
004	15th Avenue and Elkhart Street	16	7	7	4
005	32nd Avenue and Broadway West	13	7	3	3
013	25th Avenue and Louisiana Street	26	7	3	3
015	32nd Broadway and Alley 1 East	13	12	4	4
	TOTAL	26	12	7	4
East Branch Grand Calumet River					
006	Rhode Island Street at East Interceptor	10	9	7	3
007	Alley 9 at East Interceptor	4	8	7	3
008	Polk Street at East Interceptor	9	7	5	2
009	Pierce Street at East Interceptor	14	7	5	4
010	Bridge Street at East Interceptor	3	3	2	2
011	Chase Street at East Interceptor	3	3	3	2
012	Colfax Street at West Interceptor	5	4	4	4
	TOTAL	14	9	7	4
	SYSTEMWIDE TOTAL	**26**	**12**	**7**	**4**

Detail Comment #13

An additional RTC scenario was simulated with only controlling the sluice gates positions at the 32nd/Alley 1 E Diversion Structure. The impact on CSO frequency and volume are summarized in the table below along with other RTC alternatives. Operating the diversion structure would only reduce CSO frequency and volume at CSO 005 and 015 (32nd Avenue/Broadway West and 32nd Broadway/Alley 1 East). CSO frequency reduces from 13 to 7. There is negligible impact to the other outfalls.

Table D13.1. CSO Volume (MG) of Each CSO Control Alternative for the Typical Year

Alt #	Description		CSO Volume (MG) by Outfall													
			East Branch Grand Calumet River								West Branch Little Calumet River					CSO Total
			006	007	008	009	010	011	012	Sub-total	004	005	013	015	Sub-total	
			RI	A9	Polk	Pierce	Bridge	Chase	Colfax		Elkhart	32nd/B	25th/L	32nd/A1E		
10A	RTC	32nd/A1E Div	51	6.3	6.0	118	4.1	10	11	206	22	21	30	30	104	313
10B	RTC	WWTP & 32nd/A1E Div	46	5.9	5.2	80	4.0	10	10	162	22	21	30	30	104	266
10C	RTC	WWTP, 32nd/A1E Div & OF Weir	44	19	3.0	58	3.5	9.4	11	148	21	21	27	29	98	246

Table D13.2. CSO Discharge Frequency of Each CSO Control Alternative

Alt #	Description		CSO Discharge Frequency (# per year) by Outfall													
			East Branch Grand Calumet River								West Branch Little Calumet River					Total
			006	007	008	009	010	011	012	Sub-total	004	005	013	015	Sub-total	
			RI	A9	Polk	Pierce	Bridge	Chase	Colfax		Elkhart	32nd/B	25th/L	32nd/A1E		
10A	RTC	32nd/A1E Div	10	4	9	14	3	3	5	14	16	7	26	6	26	26
10B	RTC	WWTP & 32nd/A1E Div	9	4	7	11	5	2	4	11	16	7	26	6	26	26
10C	RTC	WWTP, 32nd/A1E Div & OF Weir	7	7	2	7	2	2	4	7	16	6	12	6	16	16

CDM Smith

Detail Comment #15

The following figures are updated to show log-scale in the y-axis (cost). The same data are also summarized in **Tables 5-9**, **6-1**, **6-2**, **6-4**, **6-5**, and **6-6.**

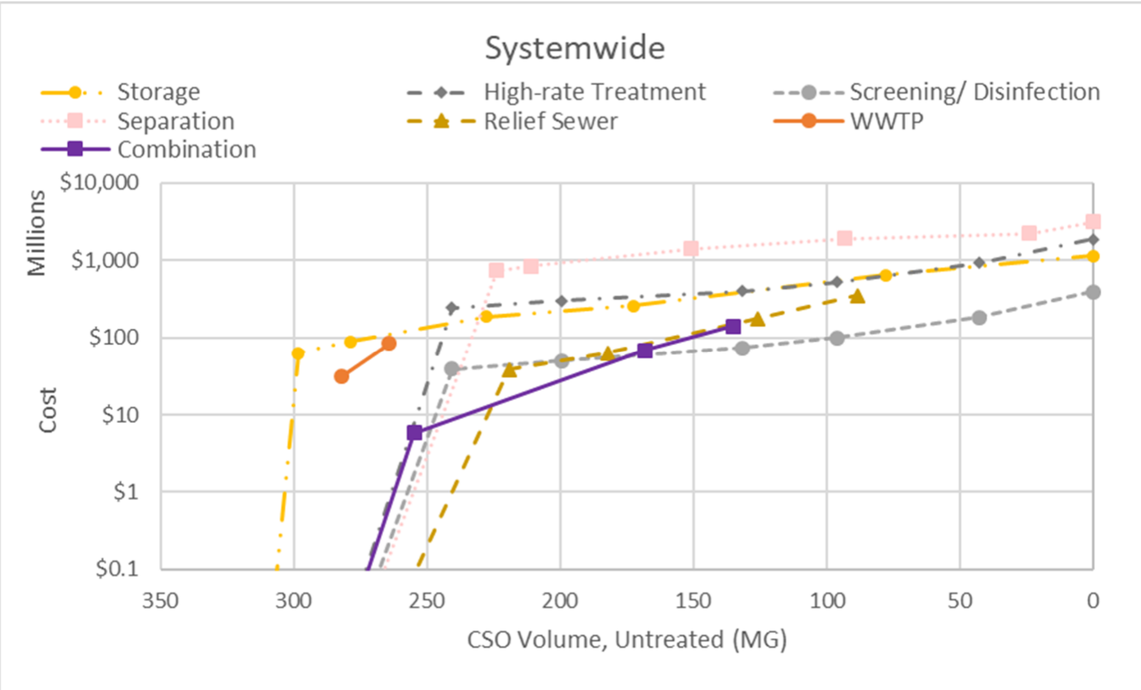


Figure 6-9. Systemwide Untreated CSO Volume versus Alternative Cost

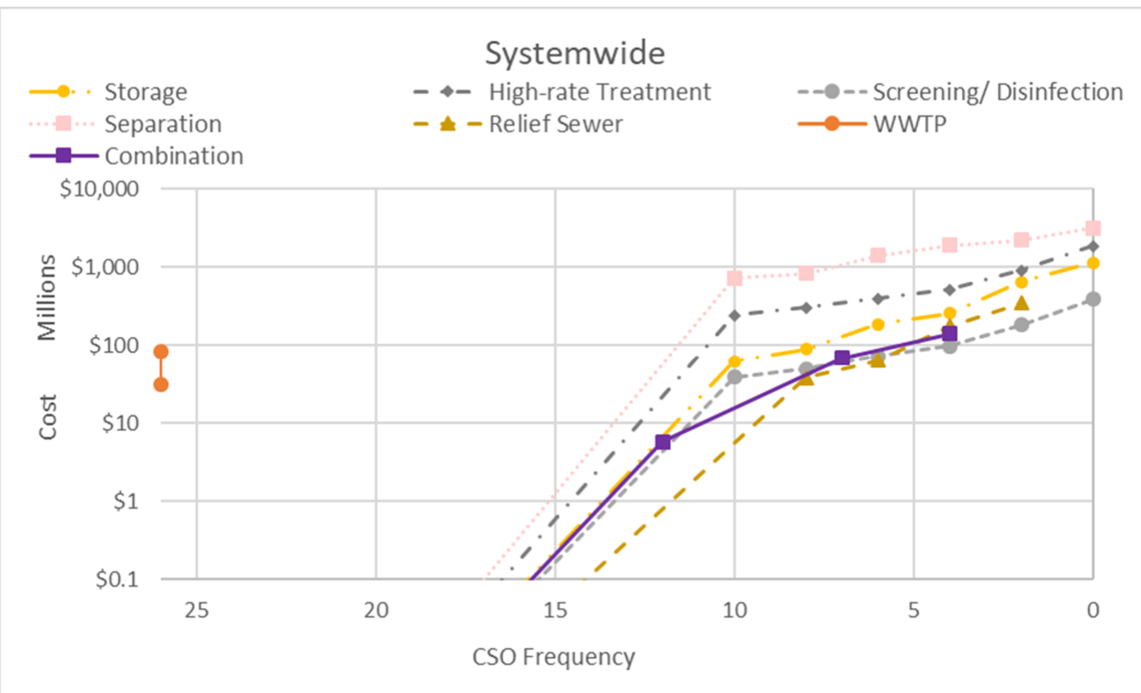


Figure 6-10. Systemwide CSO Frequency versus Alternative Cost

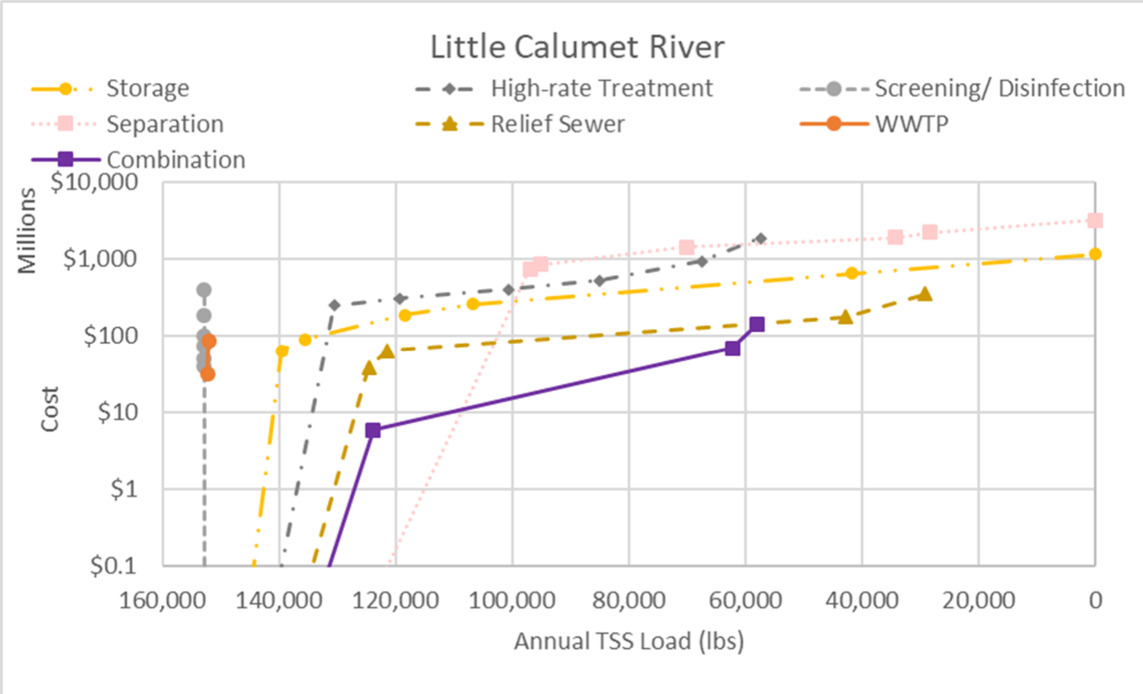


Figure 6-11. Little Calumet River Annual TSS Load versus Alternative Cost

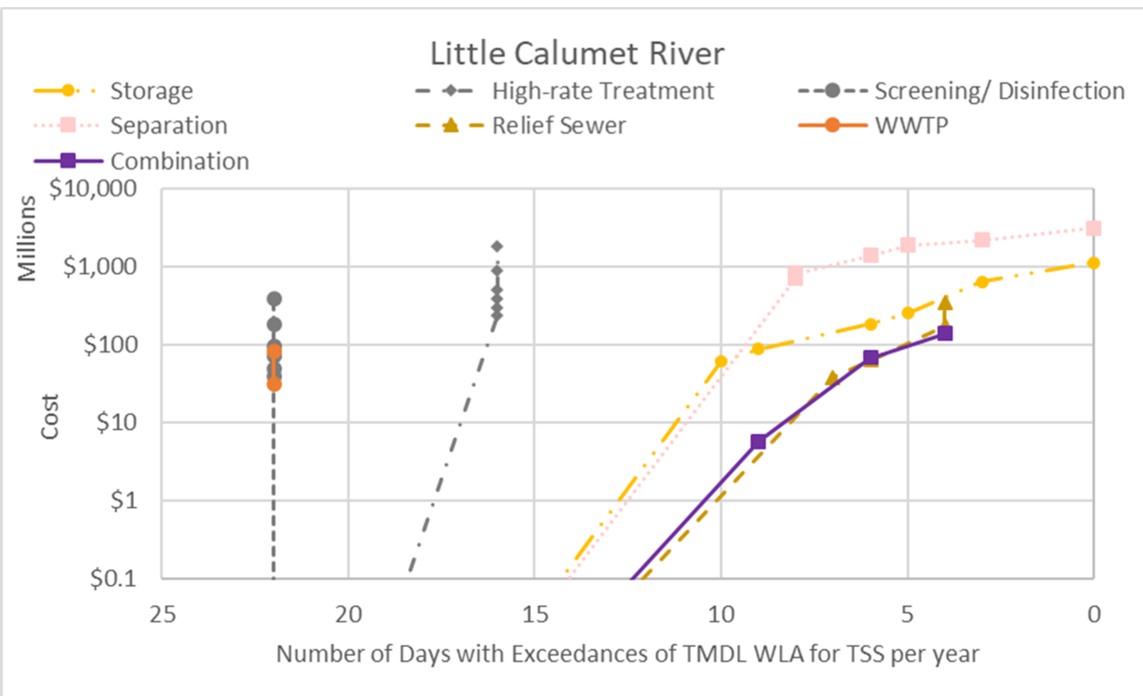


Figure 6-12. Number of Days with Exceedances of Deep River-Portage Burns Waterway TMDL Study WLA for TSS versus Alternative Cost

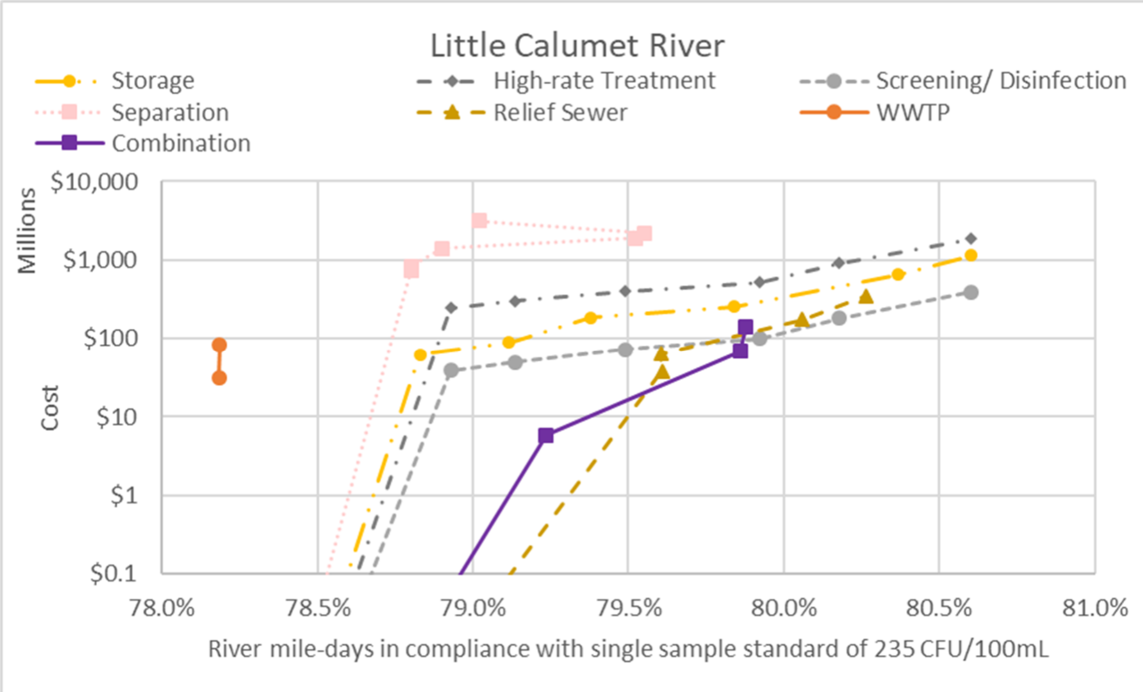


Figure 6-13. River Mile-Days in Compliance with the Single Sample Standard of 235 CFU/100mL versus Alternative Cost – West Branch Little Calumet River

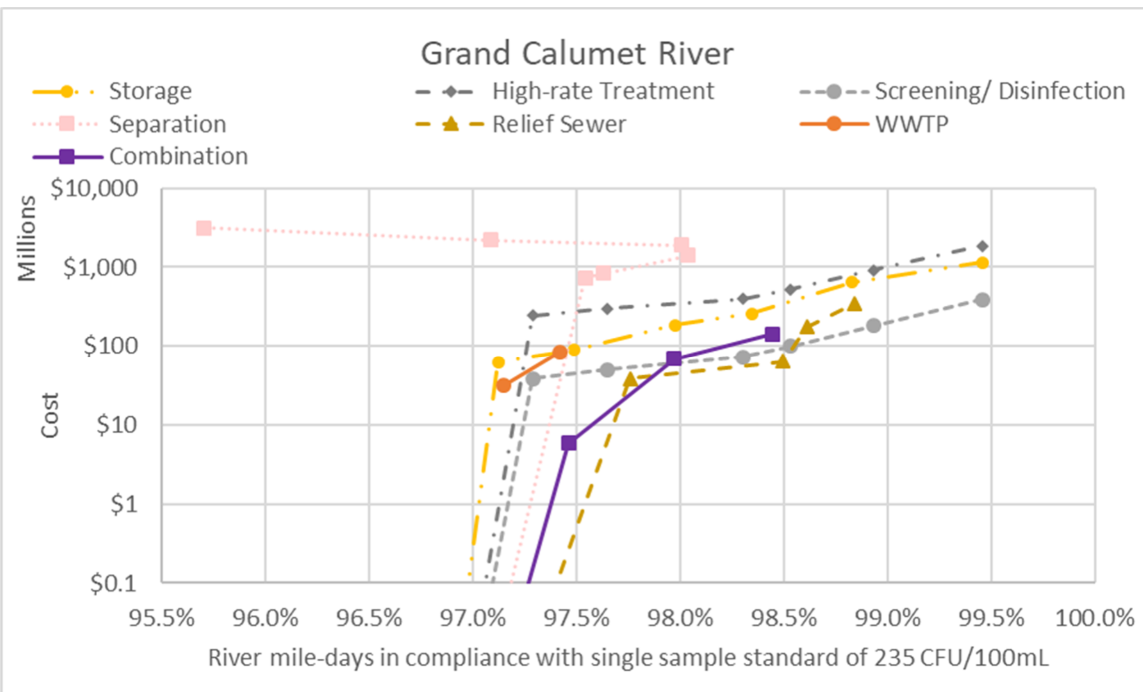


Figure 6-14. River Mile-Days in Compliance with the Single Sample Standard of 235 CFU/100mL versus Alternative Cost – East Branch Grand Calumet River

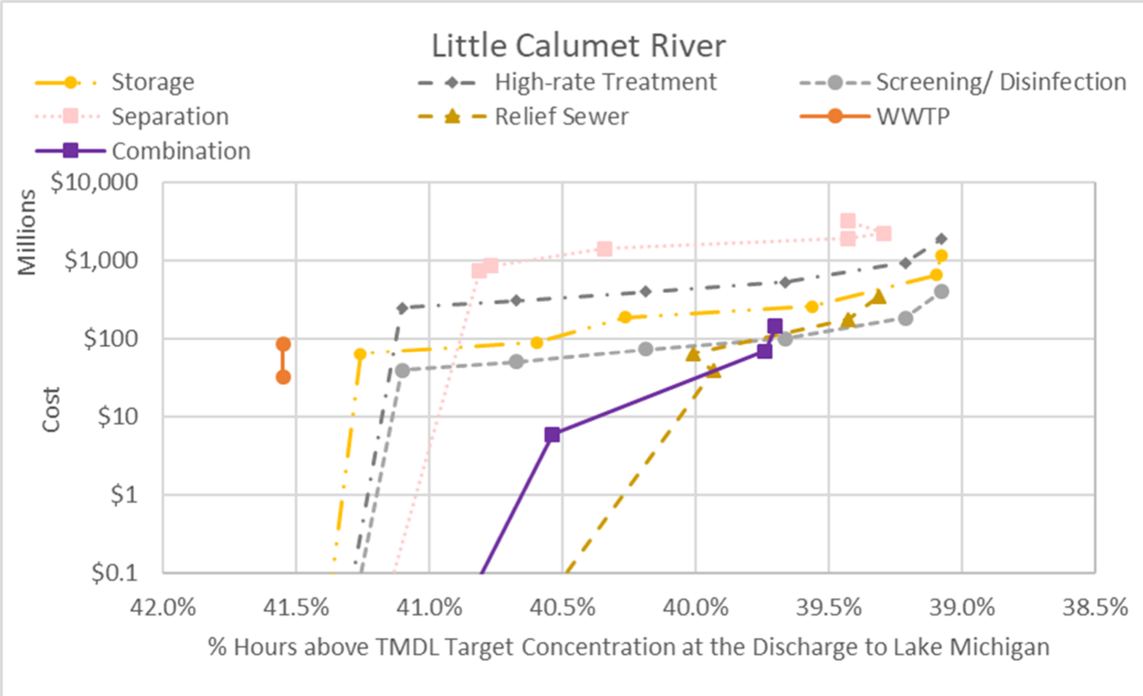


Figure 6-15. Percent of Hours above the Lake Michigan Shoreline TMDL Target of 125 CFU/100mL at the Discharge to Lake Michigan versus Alternative Cost – West Branch Little Calumet River

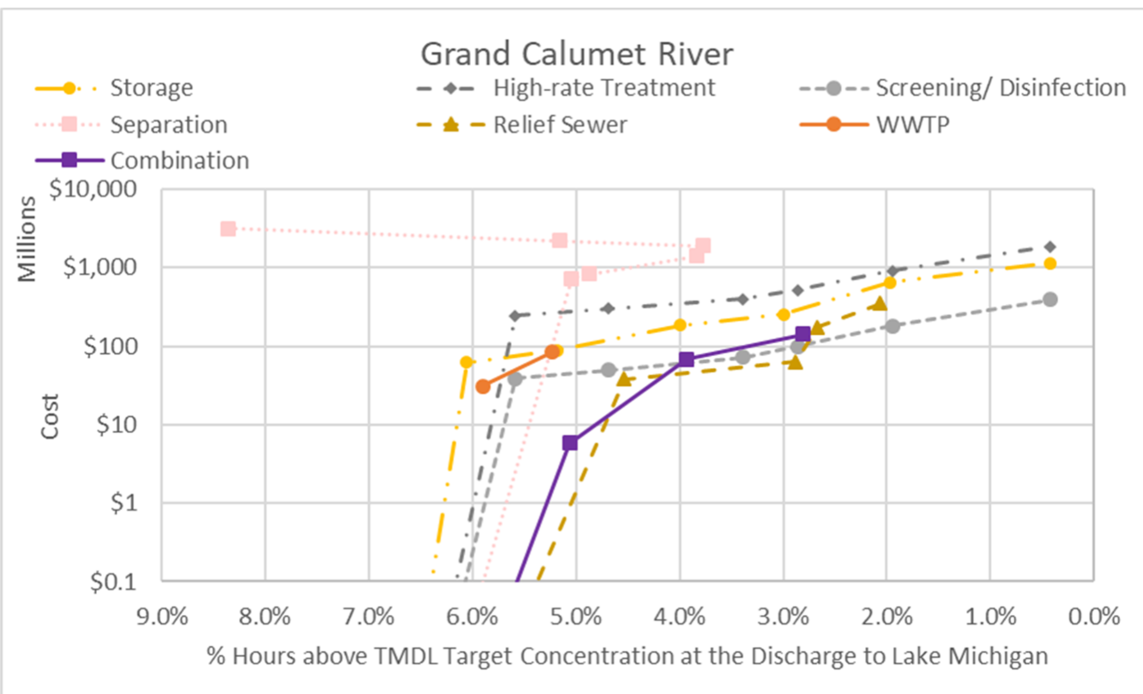


Figure 6-16. Percent of Hours above the Lake Michigan Shoreline TMDL Target of 125 CFU/100mL at the Discharge to Lake Michigan versus Alternative Cost – East Branch Grand Calumet River

Appendix 3

Financial Capability Analysis

This appendix provides GSD's response to the EPA comments related to the financial capability analysis. This evaluation is based on the financial information as it existed at the start of FY 2019, since January of 2020, the world has obviously changed significantly with the outbreak of the COVID-19 pandemic. GSD is still evaluating how severe the adverse impacts have been to date and what the implications will be into the future. Based on very preliminary data, weekly receipts for the months of March and April may have declined by as much as one third relative to the average for all of 2019. There is obviously no way to know how long this decline may continue, but even the loss of revenue suffered for the last two months will significantly impair GSD's ability to meet current obligations and certainly will require retrenching its capital program in the short term at least. And the impact could be felt for some time to come. For example, US Steel has idled the Gary Blast Furnace complex, which is a major economic activity in the City, and represents a major risk to the City's future economic prospects. US Steel represents approximately 20 percent of GSD's annual revenues. While the shut-down is officially for 48 days, given the overall economic situation that could be extended for an even further period.

The evaluation presented herein follows the request that the affordability evaluation be recast back to the 1997 guidance document format. However, based on the preceding, this evaluation should be considered a very optimistic assessment of GSD's capabilities at least for the short-term.

As part of the original submittal, GSD presented a dynamic long-term projection of the impact of anticipated capital spending, consistent with the EPA's November 2014 *Financial Capability Assessment Framework*.

The conclusions and results of the FCA as submitted are as follows:

- The City lags behind the state and nation significantly in all key measurable economic indicators including MHI, income growth, and poverty levels.
- The projected residential burden imposed by combined wastewater and stormwater bills will exceed the 2.0 percent threshold identified by EPA guidance documents by FY 2023, using city of Gary median household income (MHI) and will increase to over 5.3 percent by 2049.
- The typical household bill is projected to double from $485 in FY 2019 to $971 by FY 2033, and more than triple within 25 years.
- The impact to lowest quintile income residents is significant, with the FY 2019 wastewater and stormwater bills exceeding 4.7 percent of income and projected to increase to over 15 percent by 2049.

EPA's comments to GSD's submittal was that the financial capability analysis should be structured to follow the 1997 EPA guidance in *Combined Sewer Overflows — Guidance for Financial Capability Assessment and Schedule Development*. While GSD still believes that the dynamic evaluation provides a more robust indicator of financial capability, GSD has recast its financial projections developed in 2018 to follow the static worksheet format from the 1997 EPA guidance.

3.1 Phase 1

The first phase of the financial capability analysis determines a residential indicator, which from the 1997 guidance is defined as the average cost per household for wastewater treatment and CSO controls as a percent of local median household income. The original guidance contains worksheets to complete, with instructions for filling out each worksheet. This section follows the snapshot worksheet structure outlined in the original guidance.

Worksheet 1

Category	Value	Line	Footnote
Sewer System Current System Costs			
Annual Operations and Maintenance Expenses (Excluding Depreciation)	$21,322,566	100	1
Annual Debt Service	$2,771,290	101	2
Subtotal (Line 100 + Line 101)	**$24,093,856**	**102**	
Projected LTCP and Other CIP Costs (Current $) Through 2050 - $254.5M			
Estimated Annual Operations and Maintenance Expenses (Excluding Depreciation)	$0	103	3
Annual Debt Service (Principal & Interest)	$22,194,144	104	4
Subtotal (Line 103 + Line 104)	**$22,194,144**	**105**	
Total Current and Projected WWT and CSO Costs (Line 102 + Line 105)	**$46,288,000**	**106**	
Residential Share of Total WWT and CSO Costs	$15,517,496	107	5
Households Receiving Wastewater Services	28,086	108	6

Footnotes:

1. Based on 2018 Operations and Maintenance Costs. Includes capital outlay and transfers to equipment reserve. Reduced by outside community revenue. These numbers are not directly consistent with the original submittal, as stormwater related expenses have been excluded.
2. Current system debt service cost based on current system debt amortization schedules, as of 2018.
3. None assumed for the analysis.
4. Assuming 20-year revenue bonds at 6.0% interest.
5. Consumption of Residential and Housing Authority customer classes as percent of total consumption for 2018. Residential category 34% of total consumption.
6. Number of occupied households, 2018 US Census ACS.

Worksheet 2

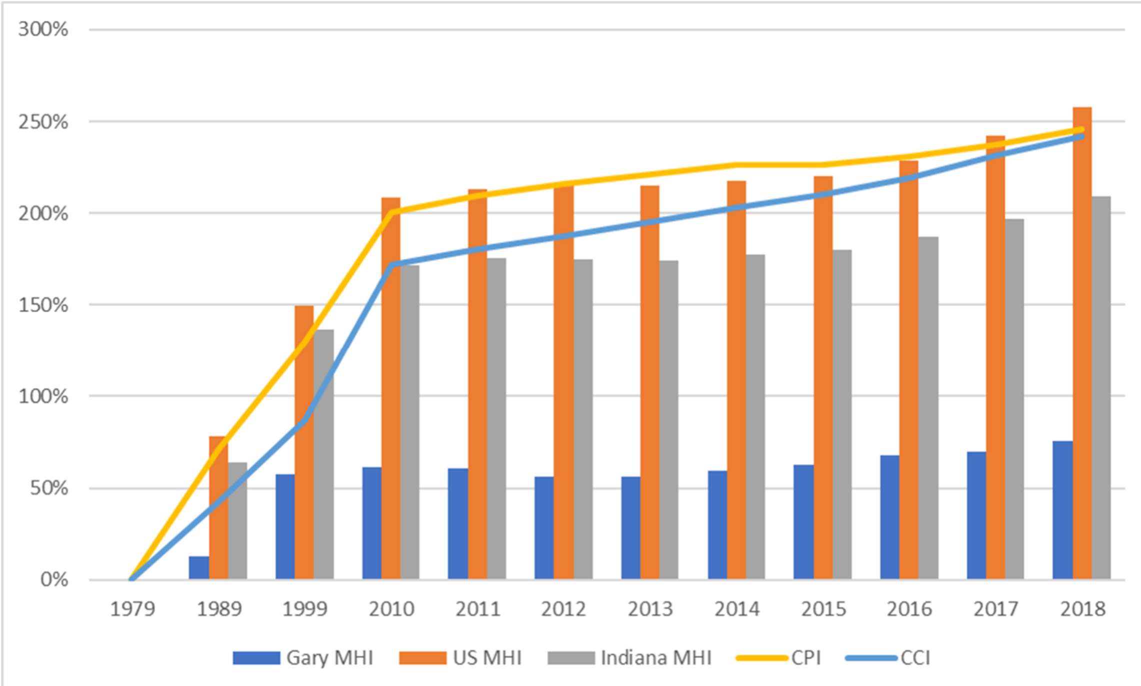
Category	Value	Line	Footnote
Median Household Income (MHI)			
Census Year MHI	$30,310	201	1
MHI Adjustment Factor	1.00	202	2
Adjusted MHI	$30,310	203	
Annual WWT and CSO Control Cost per Household (CPH) (Line 109)	$552	204	
Residential Indicator			
Annual Wastewater and CSO Control Cost per Household as a percent of Adjusted Median Household Income (CPH as % MHI) (Line 204 / Line 203)	1.8%	205	

Footnotes:
1. US Census ACS 5-Year Estimate for Gary, IN, 2018.
2. Base year and Census year the same (2018).

The residential indicator as shown in the preceding tables is just under 2.0% for the city of Gary. GSD believes there are significant shortcomings in the EPA 1997 static approach. Some of the major shortcomings include:

- No consideration for effects of inflation and MHI growth

  The 1997 guidance ignores the impact of inflation on costs over the projection period. The analysis as presented above is based on capital costs in 2018 dollars, and MHI for 2018. The current level of the City's MHI is considerably lower than state and national averages, with the disparity growing over time. Since 1999, historical median household income annual growth in Gary has been 0.6%. Over the same period, area CPI has increased at an annual rate of 1.8%, and CCI has increased at 4.1% per year. Given historical MHI growth trends, it is likely that this disparity will continue to grow in the future. As is clear from the historical data, income growth in the City has lagged significantly behind the CPI and ENR Construction Cost Index (CCI), a trend that will certainly continue for the foreseeable future. The historical and ongoing decline in real incomes that is a major contributor to the very real affordability challenge GSD faces in undertaking any CSO long-term control plan. GSD strongly believes that the EPA static approach initially developed by EPA in 1997 presents a very unrealistic view of the challenges faced by the city of Gary and GSD. The following chart shows the relative growth of the City's MHI compared to CPI, CCI, and the state and National MHI as cumulative percentage growth since 1989.



EPA has recognized the significant limitations of the static approach and endorsed in its 2014 FCA modification the use of the dynamic modeling approach that GSD used in its formal submittal to the Agencies.

- Exclusion of stormwater expenses

  The EPA 1997 focuses solely on inclusion of wastewater expenses, and excludes expenses and charges related to stormwater systems. However, GSD is responsible for the operation and maintenance of both the wastewater system and the stormwater system. GSD's residential customers are assessed a stormwater fee to fund the requirements of the stormwater system. GSD believes that the exclusion of stormwater expenses and charges in the analysis understates the true burden on its residential customers. EPA has acknowledged the impact of stormwater charges on customers and endorsed in its 2014 FCA modification the inclusion of stormwater expenses and charges to calculate the residential burden, which is consistent with GSD's formal submittal to the Agencies.

- No consideration for annual fluctuations in revenue requirements

  The 1997 EPA guidance is a static snapshot approach that focuses on a single point in time. In effect, it assumes that the annual revenue requirement increases will remain constant through the projection period. In reality, GSD's revenue requirement will fluctuate over time given the timing of expenditures, including the timing of debt service issuances and payback periods. GSD believes that the EPA static approach is an overly simplistic analysis that is not a realistic approximation for long term utility financial planning.

  As noted, EPA has recognized the significant limitations of the static approach and endorsed in its 2014 FCA modification the use of the dynamic modeling approach that GSD used in its formal submittal to the Agencies.

- No consideration for most vulnerable population (e.g. lowest quintile income)

  The 1997 EPA approach utilizes several worksheets as a calculation-based method to generate a single number for affordability (i.e. residential indicator). The calculation is based on the median household income for an entity. GSD believes that the 1997 approach is a narrow interpretation of "affordability", in part because there is no consideration for the most vulnerable population of GSD's customer base. For a household that is at or the poverty level (which accounts for over 30 percent of Gary's households), the residential burden is at least 3.2 percent. For the households at the lowest quintile income level, the burden is at least 7.3 percent. This is a significant strain on the population that is least likely to absorb dramatic sewer bill increases, and GSD believes that the inclusion of this discussion is warranted.

  While the 2014 FCA modification still utilizes median household income as the basis for the residential burden calculation, it includes language that allows for an entity to include any additional factors that it deems relevant to a discussion on affordability. GSD believes a sole focus on worksheet calculations ignores some of the underlying issues, and a calculation with accompanying narrative is more appropriate, which is the approach that GSD used in its formal submittal to the Agencies.

- No consideration for historical trends for socio-economic factors

  The city of Gary has significantly lagged behind both the state and nation in nearly every economic category. The City has a significantly higher poverty rate than the state and national average.

  The City has experienced years of population decline, which reduces the customer base to pay for infrastructure improvements. Given the combination of slow income growth, high levels of poverty and a declining population, it is unlikely that the City will experience income or population growth in line with regional and national trends—continued declines are possible.

  The 2014 FCA modification it includes language that allows for an entity to include any additional factors that it deems relevant to a discussion on affordability. GSD believes that to evaluate a full picture of affordability, socio-economic factors are important to evaluate in combination with the calculated residential burden. GSD used this approach in its formal submittal to the Agencies.

  The initial submittal to the Agencies based on the dynamic approach estimated the future household burden to exceed 5.4 percent. GSD believes that appropriately assesses the challenges GSD is facing and will face. However, this addendum has been prepared in response to a request from the Agencies. But in preparing this alternative analysis, we believe it is critical to correct one of the more serious shortcomings of the EPA static approach. Therefore, this alternative evaluation seeks to reflect to some extent the impact of GSD's low-income growth relative to utility costs. Factoring in the relative increases in expenses, capital costs and MHI, the residential burden exceeds 2.4 percent. And for a household that is at or the poverty level (which accounts for over 30 percent of Gary's households), the burden is at least 3.2 percent. For the households at the lowest quintile income level, the burden is at least 7.3 percent.

Worksheet 1

Category	Value	Line	Footnote
Sewer System Current System Costs – FY 2034			
Annual Operations and Maintenance Expenses (Excluding Depreciation)	$32,966,453	100	1
Annual Debt Service	$0	101	2
Subtotal (Line 100 + Line 101)	**$32,966,453**	**102**	
Projected LTCP and Other CIP Costs (Current $)			
Estimated Annual Operations and Maintenance Expenses (Excluding Depreciation)	$0	103	3
Annual Debt Service (Principal & Interest)	$35,054,895	104	4
Subtotal (Line 103 + Line 104)	**$35,054,895**	**105**	
Total Current and Projected WWT and CSO Costs (Line 102 + Line 105)	**$68,021,348**	**106**	
Residential Share of Total WWT and CSO Costs	$22,803,339	107	5
Households Receiving Wastewater Services	28,086	108	6
Total Cost per Household (Line 107 / Line 108)	$812	109	

Footnotes:

1. Based on projected FY 2034 Operations and Maintenance Costs. Includes capital outlay and transfers to equipment reserve. Reduced by outside community revenue. These numbers are not directly consistent with the original submittal, as stormwater related expenses have been excluded.
2. Current system debt service cost based on current system debt amortization schedules, as of FY 2034. Existing debt service fully amortized in FY 2034.
3. None assumed for the analysis.
4. Assuming 20-year revenue bonds at 6.0% interest. Capital inflated at 4% annually to FY 2034. Reduced by estimated outside community share.
5. Consumption of Residential and Housing Authority customer classes as percent of total consumption for 2018. Residential category 34% of total consumption.
6. Number of occupied households, 2018 ACS.

Worksheet 2

Category	Value	Line	Footnote
Median Household Income (MHI)			
Census Year MHI	$30,310	201	1
MHI Adjustment Factor	1.10	202	2
Adjusted MHI	$33,208	203	
Annual WWT and CSO Control Cost per Household (CPH) (Line 109)	$812	204	
Residential Indicator			
Annual Wastewater and CSO Control Cost per Household as a percent of Adjusted Median Household Income (CPH as % MHI) (Line 204 / Line 203)	2.4%	205	

Footnotes

1. ACS 5-Year Estimate for Gary, IN, 2018.
2. Based on historical annual MHI growth since 1999 for Gary, IN. MHI projected to FY 2034.

The second phase of the EPA financial capability assessment is an evaluation of socio-economic factors as compared to EPA benchmarks. The results of this analysis are presented in this section.

3.2 Phase 2

The Phase 2 assessment as outlined in the 1997 EPA guidelines evaluates financial impact indicators to benchmark an entity relative to a defined scoring system. These indicators evaluate ancillary factors that may impact an entity's ability to fund the capital program that may not have been apparent in the first phase of the financial capability analysis.

For the purposes of this analysis, only indicators that apply to GSD as a stand-alone authority are reflected in this analysis, however data for the city of Gary is used as the representative figure for indicators that apply to the socio-economic status of the population (i.e. unemployment and median household income).

The assessment as documented in the guidance identifies six benchmarks, in the categories listed below:

- Debt Indicators:
  - Bond Rating
  - Overall Net Debt
- Socio-economic Indicators:
  - Median Household Income
  - Unemployment Rate
- Financial Management Indicators:

- Property Tax Revenue
- Property Tax Collection Rate

The EPA guidance defines a rating criterion for each of the categories on a 1 to 3 scale, with a score of 1 defined as a weak score and a score of 3 defined as a strong score. Each category has a benchmark the entity is compared against, to produce a rating for the indicator. The average of the scores are evaluated within the context of EPA guidance to determine an overall score.

GSD is not a taxing entity and does not utilize property taxes to support its operations, therefore the indicators related to property taxes and property values have been omitted from the analysis. This includes both factors in the Financial Management Indicators category. In addition, as a separate entity GSD has historically issued revenue bonds and does not carry any tax backed bonds, so the Overall Net Debt indicator has been excluded from this analysis.

While the first phase of the financial capability analysis is a time-series analysis, the Phase 2 assessment is a cross-sectional view of GSD's financial capability.

The following sections summarize each of the factors and how GSD's values compare to EPA benchmarks.

3.3 Debt Indicators

The two debt indicators in Phase 2 of the financial capability assessment are bond rating and overall net debt. These indicators are intended to indicate an entity's capacity to gain access to capital markets to raise the necessary capital to implement future capital plans.

3.3.1 Bond Rating

The bond rating indicator is intended to address general capacity to undertake debt. Rating designations vary by credit rating agencies, however long-term bond ratings can range from AAA/Aaa (high grade) to C/D (in default).

GSD does not have a current bond rating and has not undertaken a market bond issue that would necessitate a bond rating given its challenging financial and economic conditions. GSD would likely be in the very lowest range of the bond rating indicator if it were to seek a rating.

3.3.2 Overall Net Debt as a Percent of Full Market Property Value

Overall net debt is the amount of tax-backed bonded debt for all taxing units not supported by revenue from sewer user fees. GSD does not have any tax-backed bonded debt, as it issues revenue bonds supported by sewer user fees. As such, this factor has not been included in the analysis.

3.4 Socio-economic Indicators

The two socio-economic indicators used in Phase 2 analysis in the financial capability assessment are unemployment rate and median household income. These indicators are indicative of an entity's general economic condition.

3.4.1 Unemployment Rate

Unemployment rate is a measure of an entity's labor force that is unemployed but seeking employment. For the purpose of this factor, the city of Gary has been used as the representative population for GSD. The EPA guidance document defines the benchmarks for unemployment rate as:

- **Strong (Score = 3)** — unemployment rate is more than one percent below the national average.
- **Mid-Range (Score = 2)** — unemployment rate is within one percent (+/-) of the national average.
- **Weak (Score = 1)** — unemployment rate is more than one percent above the national average.

The unemployment rate for Gary, as compared to the national average, is shown in **Table 3-1**. The City's average unemployment rate in 2018, according to the U.S. Bureau of Labor Statistics, was 7.2 percent, 3.8 percent more than the state average rate of 3.4 percent, and 3.3 percent more than the national average rate of 3.9 percent. The 2018 annual average is the most recent full year average from the BLS (2019 data is still preliminary). Based on preliminary unemployment data for January 2020, Gary's unemployment rate is 6.7 compared with the national rate of 4.0. Since the City's unemployment rate is more than one percent of the national average, it corresponds to a weak rating according to EPA guidelines.

Table 3-1. Unemployment Rate
Worksheet 5

Item	Value
Gary Unemployment Rate (2018)	7.2 percent
National Unemployment Rate (2018)	3.9 percent
Comparison with National Average (2018)	3.3 percent above
Unemployment Rate Indicator Score	1

3.4.2 Median Household Income

While the first phase of the financial capability analysis focuses on an association between median household income and average annual household bills, the median household income indicator for Phase 2 focuses solely on and entity's median household income compared to the national median household income. Thus, this benchmark is a measure of the relative wealth of the service area. The EPA guidance document benchmarks for median household income are:

- **Strong (Score = 3)** — median household income is more than 25 percent above the national average.
- **Mid-Range (Score = 2)** — median household income is within 25 percent (+/-) of the national average.
- **Weak (Score = 1)** — median household income is more than 25 percent below the national average.

The City and national median household income values, shown in **Table 3-2**, are based on the most recent Census Bureau, American Community Survey (ACS) data. Gary's median household income is 49.7 percent below national median household income, which corresponds to a weak rating.

Table 3-2. Median Household Income

Item	Value
Median Household Income – Gary (2018 ACS)	$30,310
Benchmark	
- National MHI (2018 ACS)	$60,293
- MHI Adjustment Factor	1.0
- Adjusted National MHI	$60,293
Compare Permittee with Average National MHI	49.7 percent below
Median Household Income Indicator Score	1

3.5 Financial Management Indicators

The two financial management indicators are property tax revenues and tax collection efficiency. The indicators are used to assess a community's capacity to support debt. Since GSD is not a taxing entity and does not utilize property taxes to support its operations, these indicators have been excluded from the analysis.

3.6 Summary of Financial Impact Indicators

Table 3-3 shows the EPA's Phase 2 financial impact indicator benchmarks used to evaluate the indicators that were included in this analysis. The indicators relevant to GSD are shown in the left-hand column, with the corresponding EPA benchmarks for each indicator shown with ratings as "strong", "mid-range" or "weak". The highlighted boxes in this table indicate where GSD falls within the framework of these indicators.

Table 3-3. Financial Impact Assessment Benchmarks

Indicator	Strong (Score=3)	Mid-Range (Score=2)	Weak (Score=1)
1. Unemployment Rate	>1 percent below National Average	±1 percent of National Average	>1 percent above National Average
2. Median Household Income	>25 percent above adjusted National MHI	±25 percent of adjusted National MHI	>25 percent below adjusted National MHI

The values and scores of the relevant indicators for GSD are summarized in **Table 3-4**. An overall (average) score below 1.5 is considered weak and an overall score above 2.5 is considered strong. An overall score between 1.5 and 2.5 is considered mid-range. The un-weighted average score for the Phase 2 evaluation for indicators relevant to GSD is 1, which falls in the lowest range of the financial capability scale.

Table 3-4. Financial Impact Assessment Summary

Financial Impact Indicator	Value	Score
1. Unemployment rate compared with national average	3.3 percent above	1
2. Median household income compared with national average	49.7 percent below	1
Overall Financial Impact Indicator Score		**1**